

CHAPTER 5

AFTERCOOLER AND SEPARATOR

5-1. Design.

An after cooler complete with moisture separator to condense and remove water vapor and oil vapor will be used. After-coolers should be air-cooled type or water cooled type to best suit installation and economic requirements. Air is cooled to below its dew point in the after cooler, and the condensed water and oil are then removed by the moisture separator and automatic moisture trap. The after cooler and separator will be located between the compressor and air dryer or receiver, as close to the compressor as possible. Water cooled aftercoolers should be protected against freezing. As a general rule, a differential of 15 degrees F should be maintained between the temperature of the cooling water entering and the air temperature leaving the aftercooler.

5-2. Circulating water.

An adequate waterflow through the intercooler, cylinder jacket, and aftercooler is required for cooling the compressor, cooling the compressed air, and for moisture removal. A waterflow sensing control (flow switch) is needed which verifies that sufficient cooling water is flowing before the compressor is allowed to start. Water for the aftercooler for liquid seal rotary compressors should be piped in series with the compressor. Waterflow, prior to startup, for rotary screw compressors and rotary lobe compressors is not required. Piping will be designed to conform to the manufacturer's recommendations. A strainer or filter should be used in the piping system to reduce fouling of the cooler system components.

a. Heat dissipation from intercoolers, cylinder jackets, and aftercoolers is listed in table 5-1.

Table 5-1. Heat dissipation
Btu/minute/bhp total

	Single-Stage	Two-Stage
Intercooler	None	20
Cylinder jacket	15	5
Aftercooler	26	17

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b. The amount of cooling water required for intercoolers, cylinder jackets, and aftercoolers may be determined as follows:

$$\text{gpm} = \frac{\text{bhp} \times \text{heat dissipation}}{\text{t-rise} \times 8.33}$$

Where:

gpm = gallons of water flow per minute.

bhp = air compressor brake horsepower.

Heat dissipation = value from table 5-1.

t-rise = degrees F, water temperature rise.

To keep condensation from forming in the cylinder inlet ports, keep the temperature of cooling water entering cylinder jackets 15 degrees F, above the dew point of the incoming air. This can be accomplished by circulating water through the intercooler first, and then piping the same water through the cylinder jackets. An alternate method is to reduce the water supply to the cylinder jackets. The compressor manufacturer should be consulted to verify the cooling water requirements for cooling compressor cylinder jackets.